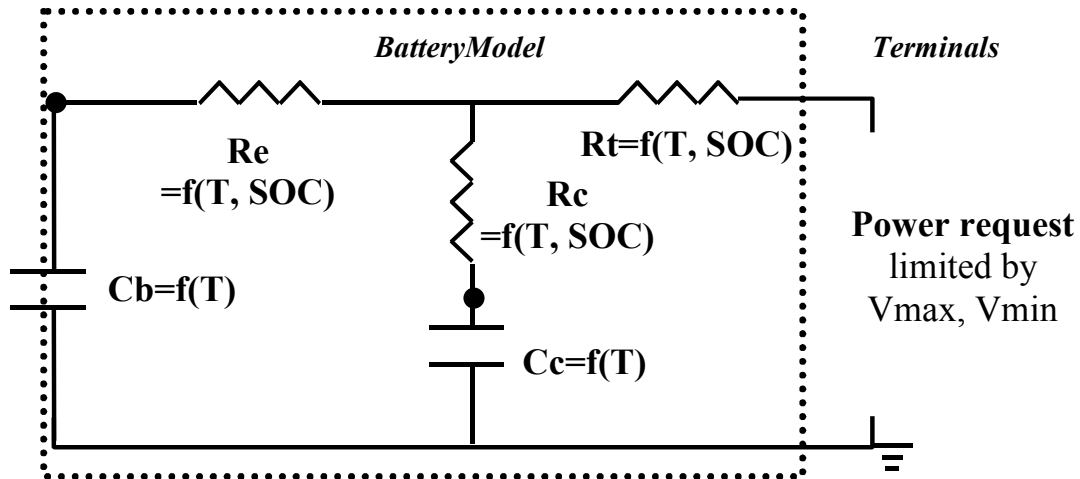


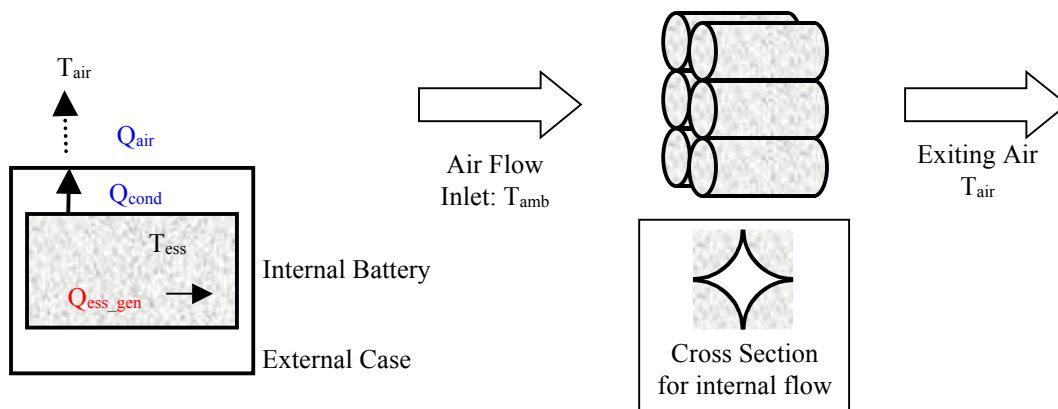
RC model (electrical model):

Description: The RC battery model has three resistances (functions of temperature and State of Charge) and two capacitors (functions of temperature). The model receives a power request from the vehicle, and keeps the output voltage within the minimum and maximum voltage limits. The capacitor C_b is very large and represents the ample capability of the battery to store charge chemically. The capacitor C_c is small and mostly represents the surface effects of a cell, e.g. the immediate amount of current a battery can deliver based on time constants associated with the diffusion of materials and chemical reactions.



(thermal model taken from previous ADVISOR model)

Description: The thermal model for ADVISOR's battery model was developed for a previous release of ADVISOR. The model is a lumped-capacity model with conduction through an external case and convection to ambient air characterized by internal flow. The heat generated within the battery is the i^2R losses from the three resistors.



Battery current comparison of RC and Rint models (RC is new model) over US06 cycle:

Description: The following graph shows the comparison of battery current in a parallel vehicle over the US06 cycle of the new RC battery model to the old Rint (internal resistance and open circuit voltage) model. The RC model reaches maximum and minimum currents of 280A discharge and -123A charge, and the Rint model reaches 177A discharge and -68A charge. The Rint model reaches its voltage limits during these high current spikes and is unable to deliver the requested power. The RC model therefore allows the vehicle to see up to 60% more discharge current available from the battery, and 80% more charge current, improving both acceleration performance and regenerative braking capture.

